



<sup>1</sup>**Arithmetic Proficiency** is an appreciation of number and number operations, which enables mental calculations and written procedures to be performed efficiently, fluently and accurately.

<sup>2</sup>**Mathematical Proficiency** requires a focus on core knowledge and procedural fluency so that pupils can carry out mathematical procedures flexibly, accurately, consistently, efficiently, and appropriately. Procedures and understanding are developed in tandem.

It is not enough to learn procedures; calculations need to make sense too. Structured written methods need to be based on an understanding gained from practical work, images, models and informal methods. These can then be confidently applied to different circumstances leading to success in higher levels of maths. Limited understanding of the key ideas underlying the progression of calculation strategies makes children less flexible when using number. Children need to have opportunities to reflect on and reason about the actions and processes they use in order to refine them and gain deeper understanding.

An ability to calculate mentally lies at the heart of numeracy. Written methods are also important and there needs to be a balance between the two approaches. Research nationally and within BLC has shown that many children fail to make use of a written strategy that enables them to get the right answer when calculating. Many children use inefficient, inaccurate methods which do not enable them to succeed. The ability to be able to perform accurately and efficiently when working with the four operations increases enjoyment of maths

Our aim is for children to be able to pick the most efficient and accurate methods of calculation taking into account the numbers to be operated on. Eg  $99+100$  would be dealt with differently to  $233+188$ . Children need to have a broad range of strategies to choose from.

Our work with Braunton Academy has highlighted that many low achievers benefit from being taught a single method to deal with calculations in year 7 as it helps them to access the rest of the curriculum and feel more confident. The children at this level feel confused about lots of different methods and vocabulary and are happier to have a “fail safe” method of calculating enabling them to participate in lessons. They do not like to use apparatus or anything that makes them stand out in classes.

At all stages of calculations a good knowledge of key skills and key facts such as tables and number bonds have a huge impact on the speed of calculations, the ability to access higher levels of maths and confidence as well as enjoyment of maths. It is vital that these are taught and learnt thoroughly.

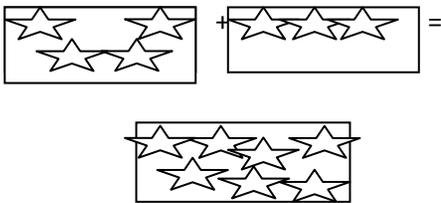
Written work can take many different forms including:

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■ pictorial recording; ■ informal jotting  
signs and symbols; ■ use of increasingly

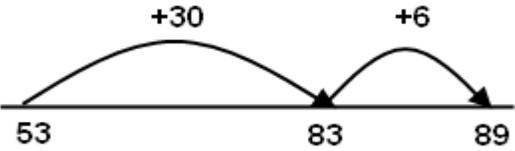
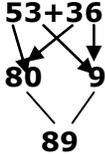
PROGRESSION IN ADDITION

words describing a mental calculation; ■ use of appropriate

<p>Key skills 1.</p>	<p>Say numbers Counting forwards Counting backwards Recognise numerals Write numerals Counting objects/ symbols assigning each number to 1 object...1-1 correspondence In practical activities and discussions use mathematical vocabulary involved with addition.  Using and understanding conventional symbols</p>	
<p>Count on 1 more</p>	<p>Through practical activities , rhymes and songs</p>	<p>2 and 1 more = 3</p>
<p>Combining 2 sets of object ( aggregation)</p>	<p>Issue: tendency to count one set then count the other and then count all. ( count all )</p>	<p>4+3=7  </p>
<p>Adding onto a set ( augmentation)</p>	<p>This requires fluency with counting on from any number. Children need experience of starting from the largest number in a set then counting on.</p>	 <p>3 stars add 2 more = 5</p>
<p>know by heart all pairs of numbers with a total of 10  Rehearse number bonds of single</p>	<p><b>These are key facts that need to be learnt and continually reinforced.</b></p>	





<p>Rehearse number bonds to 20</p>	<p><b>These are key facts that need to be learnt and continually reinforced.</b></p>	
<p>Doubling single digit numbers</p>	<p><b>These are key facts that need to be learnt and continually reinforced.</b></p>	
<p>Identifying near doubles and compensating</p>		<p><b>6+7 = 6+6-1=13</b></p>
<p>Adding 2 digit numbers not bridging 10</p>	<p>At all stages diennes blocks, counters, other manipulatives foster deeper understanding and visual images.</p>  <p>This requires place value knowledge and partitioning of tens and units</p>	<p><b>Tens units</b></p> $  \begin{array}{r}  50 \quad 3 \\  + \quad 30 \quad 6 \\  \hline  80 \quad + \quad 9 = 89 \\  \hline  \end{array}  $ <p>Or</p> 
<p>Adding 2 digit numbers bridging 10</p>	<p>Continue work with place value, partitioning and recombining</p>	<p>Use an empty number line</p> <p>-----</p> <p><b>Tens units</b></p> $  \begin{array}{r}  50 \quad 5 \\  + \quad 30 \quad 8 \\  \hline  80 \quad + \quad 13 = 93 \\  \hline  \end{array}  $



		$  \begin{array}{r}  55+38 \\  \swarrow \quad \searrow \\  80 \quad 13 \\  \swarrow \quad \searrow \\  93  \end{array}  $
Using the expanded columnar method...vertical addition	Headings of HTU may be useful to keep place value correct.	$  \begin{array}{r}  625 \\  +48 \\  \hline  13 \quad 5 + 8 \\  60 \quad 20 + 40 \\  600 \quad 600 + 0 \\  \hline  673  \end{array}  $
Using the contracted method of addition	<p>Make sure that children understand the idea of "carrying" What is the value of the number being carried? Use diennes blocks/ counters to model this</p> <p>Go back to previous stage if necessary.</p>	$  \begin{array}{r}  587 \\  + 475 \\  \hline  1062 \\  11  \end{array}  $
Extend to addition of decimals	<p>Decimals Add 2 or more with up to 4 digits and one or two decimal places e.g. 24.9 + 7.25</p>	$  \begin{array}{r}  24.90 \\  + 7.25 \\  \hline  32.15 \\  11  \end{array}  $
<p>Continue with mental methods To ensure flexibility of thinking. Consider the numbers being dealt with and make a sensible choice about the best strategy to use. Estimate what the answer might be. Use inverse operations to check the answer.</p>		